



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,196	08/30/2001	Charles E. May	01-146	8500
<div><div>7590</div><div>10/09/2007</div><div>Sandeep Jaggi c/o Mark Salvatore LSI Logic Corporation, M/S D-106 1551 McCarthy Boulevard Milpitas, CA 95035</div></div>				
<div>EXAMINER UMEZ ERONINI, LYNETTE T</div>				
<div><div>ART UNIT</div><div>PAPER NUMBER</div><div>1792</div></div>				
<div><div>MAIL DATE</div><div>DELIVERY MODE</div><div>10/09/2007</div><div>PAPER</div></div>				

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 09/943,196	<b>Applicant(s)</b> MAY, CHARLES E.	
	<b>Examiner</b> Lynette T. Umez-Eronini	<b>Art Unit</b> 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 09 July 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 6-11, 13 and 21-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13 is/are allowed.
- 6) ☒ Claim(s) 6-11 and 21-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 8/30/2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This communication is in response to Applicant's Remarks, filed 7/9/2007, which were persuasive in showing the formerly applied references failed to teach disposing said second volume of said aqueous slurry/nonaqueous solvent mixture containing an abrasive material onto said semiconductor wafer. Hence, a new rejection is presented.

#### ***Specification***

1. The amendment filed 6/27/2005, 1/17/2007, and 6/16/2006 are objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

"reducing the pressure of said polishing pad on said semiconductor wafer after disposing said first volume of said aqueous slurry/nonaqueous solvent mixture onto said semiconductor wafer and before completing disposing said second volume of said aqueous slurry/nonaqueous solvent mixture onto said semiconductor wafer, as in (previously presented) claim 22;

"reducing the pressure of said polishing pad on said semiconductor wafer prior to completing disposing a volume of the nonaqueous liquid including a nonaqueous solvent onto said semiconductor wafer, as in (currently amended) claim 25;

Art Unit: 1765

"reducing the pressure of a polishing pad on said front side of said semiconductor wafer prior to completing disposing a volume of nonaqueous liquid including a nonaqueous solvent onto said semiconductor wafer, as in claim 26;

"wherein reducing the pressure further comprises reducing the pressure of said polishing pad on said semiconductor wafer during, and prior to completing, the disposing of the volume of nonaqueous liquid including the nonaqueous solvent onto said semiconductor wafer, as in(new) claim 27; and

wherein step c) further comprises reducing the pressure of said polishing pad on said semiconductor wafer during, and prior to completing, the disposing of the volume of nonaqueous liquid including the nonaqueous solvent onto said semiconductor wafer, as in (new) claim 28, are not supported by the Specification.

The passage, "Furthermore, if desired, controller 60 may cause wafer carrier 30 to decrease the force applied in the general direction of arrow 38 so as to facilitate the advancement of the nonaqueous solvent into contact with the front side 24 of the semiconductor wafer 26 (Specification, page 12, lines 17-20), which Applicant has relied upon to support the above claims fails to disclose the use of pressure.

Applicant is required to cancel the new matter in the reply to this Office Action.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Art Unit: 1765

3. Claims 6-9, 11, 22 and 25-28 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitations of claims 22 and 25-28 as recited above in paragraph 1 are directed to reducing the pressure of said polishing pad on said semiconductor wafer at various periods during and prior to completing the disposing of a volume of nonaqueous liquid including nonaqueous solvent onto the semiconductor wafer, are not supported by the Specification. Further, Applicant has failed to show how pressure is reduced between the polishing pad and wafer when there is nothing there between.

It is noted: pressure is force/unit area.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 6 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Kobayashi (US 5,985,045).

Kobayashi teaches a chemical-mechanical polisher that includes a container **111** of concentrated polishing fluid and a container **112** of diluent, and the components in

the containers are in-line mixed to form a polishing fluid (column 53, lines 11-35). The polishing fluid includes a liquid or a slurry and the diluent includes water, an alcohol, glycol, and the like (column 3, lines 17--19). The mixed solution polishing flows into the chemical-mechanical polishing section **13** (column 3, lines 36-43). The aforementioned reads on,

A method of fabricating a semiconductor wafer, comprising:

(a) mixing an aqueous slurry containing an abrasive material and a nonaqueous solvent in a mixing unit so as to create a first volume of an aqueous slurry/nonaqueous solvent mixture with a first weight % of said nonaqueous solvent prior to being disposed onto said semiconductor wafer;

(b) disposing a volume of nonaqueous liquid including a non-aqueous solvent containing an abrasive material onto a semiconductor wafer;

(c) polishing the semiconductor wafer with a polishing pad using said first volume.

Since Kobayashi teaches any dilution ratio may be used (column 5, lines 34-35) then using Kobayashi's dilution method further reads on,

(e) disposing said second volume of said aqueous slurry/nonaqueous solvent mixture containing an abrasive material onto said semiconductor wafer; and

(f) polishing said semiconductor wafer using said second volume, **in claim 21**;  
and

said weight % of said nonaqueous solvent in said aqueous slurry/nonaqueous solvent mixture is increased until said aqueous slurry/nonaqueous solvent mixture is substantially free of said aqueous slurry, **in claim 6.**

***Claim Rejections – 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US '045) as applied to claim 21 above, and further in view of Tsuchiya et al.

(US 5,733,177) and Claims 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US '0450) in view of Tsuchiya et al. (US '177).

Kobayashi differs in failing to teach

(c) facilitating the advancement of the nonaqueous liquid into contact with the semiconductor wafer by reducing the pressure between said polishing pad and said semiconductor wafer after disposing said first volume of said aqueous slurry/nonaqueous solvent mixture onto said semiconductor wafer, **in claim 25**;

reducing the pressure of said polishing pad on said front side of said semiconductor wafer prior to completing disposing a volume of nonaqueous liquid including the nonaqueous solvent onto said semiconductor wafer, **in claim 26**;

wherein reducing the pressure further comprises reducing the pressure of said polishing pad on said semiconductor wafer during, and prior to completing, the disposing of the volume of nonaqueous liquid including the nonaqueous solvent onto said semiconductor wafer, **in claim 27**; and

wherein step c) further comprises reducing the pressure of said polishing pad on said semiconductor wafer during, the disposing of the volume of nonaqueous liquid including the nonaqueous solvent onto said semiconductor wafer, **in claim 28**.

Tsuchiya teaches, "the applied pressure between the polishing pad and the wafer is simultaneously quickly decreased to reduce mechanical abrasion effects" (claim 8).

Tsuchiya illustrates reducing the pressure of a polishing pad on a semiconductor wafer is known. Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kobayashi by using Tsuchiya's method of



reducing the pressure of a polishing pad on a semiconductor wafer, including reducing the pressure of the polishing pad at periods as specifically claimed by Applicants, for the purpose of reducing abrasion effects (Tsuchiya, claim 8).

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US '045) in view of Tsuchiya (US '177) as applied to claim 25 above, and further in view of Zhou et al. (US 5,780,358).

Kobayashi in view of Tsuchiya differs in failing to teach said nonaqueous solvent includes dimethylsulfoxide (DMSO).

Zhou teaches "Preferably, the non-aqueous coordinating solvent with the Chemical-Mechanical Polishing (CMP) slurry composition of the present invention is chosen from the group of . . . (DMSO)" (column 8, lines 1-6). "In addition to the non-aqueous coordinating solvent, . . . the abrasive powder, various other components may optionally be included within the Chemical-Mechanical Polishing (CMP) slurry composition of the present invention. These components include but are not limited to . . . aqueous and non-aqueous co-solvents . . . and the like as are know in the art to impart other desirable properties to the Chemical-Mechanical Polish (CMP) slurry composition of the present invention" (column 8, lines 40-49).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Kobayashi in view of Tsuchiya by including DMSO to a polishing slurry, as taught by Zhou for the purpose of assisting in rapid dissolution of copper metal under mild conditions (column 7, lines 51-55).

***Allowable Subject Matter***

10. Claim 13 is allowed.

11. The following is a statement of reasons for the indication of allowable subject matter: As to claim 13, the prior art of record, taken either alone or in combination fails to suggest, teach, or obvious a method of polishing a semiconductor wafer, comprising disposing a nonaqueous solvent on said semiconductor wafer during chemical mechanical polishing to rinse the wafer, wherein said nonaqueous solvent includes an amine, along with the rest of the limitations of the claim.

***Response to Arguments***

12. Applicant's arguments filed 7/9/2007, with respect to the new matter rejection of claims 6-9, 11, 22, and 25-28 under 35 U.S.C. 112(1) as failing to comply with written description requirement have been fully considered but they are not persuasive. Applicants support for the newly claimed limitation:

"reducing the pressure of said polishing pad on said semiconductor wafer after disposing said first volume of said aqueous slurry/nonaqueous solvent mixture onto said semiconductor wafer and before completing disposing said second volume of said aqueous slurry/nonaqueous solvent mixture onto said semiconductor wafer, as in (previously presented) claim 22;

"reducing the pressure of said polishing pad on said semiconductor wafer prior to completing disposing a volume of the nonaqueous liquid including a nonaqueous solvent onto said semiconductor wafer, as in (currently amended) claim 25;

"reducing the pressure of a polishing pad on said front side of said semiconductor wafer prior to completing disposing a volume of nonaqueous liquid including a nonaqueous solvent onto said semiconductor wafer, as in claim 26;

"wherein reducing the pressure further comprises reducing the pressure of said polishing pad on said semiconductor wafer during, and prior to completing, the disposing of the volume of nonaqueous liquid including the nonaqueous solvent onto said semiconductor wafer, as in (new) claim 27; and

wherein step c) further comprises reducing the pressure of said polishing pad on said semiconductor wafer during, and prior to completing, the disposing of the volume of nonaqueous liquid including the nonaqueous solvent onto said semiconductor wafer, as in (new) claim 28, are not supported by the Specification (page 12, lines 17-20). The Specification discloses, decreasing the force applied to the wafer carrier 30 results in a reduction of the force with which the front face 24 of the semiconductor wafer 25 is forced against the polishing pad 22 and not reducing pressure, which is required by the claims.

13. Applicant's arguments, see Remarks (pages 11-17 filed 7/9/2007, with respect to the rejection(s) of claim(s) 6 and 21-24, 24 under 35 § U.S.C. 103(a) over Koos et al. (US 5,934,980) in view of Muroyama et al. (US 6,126,514) and Kobayashi (US 5,985,045;

claims 25-26 under 35 § U.S.C. 103(a) over Koos (US '980) in view of Tsuchiya et al. (US 5,733,177); and

Claim 8 under 35 U.S.C. 103(a) over Koos (US '980) in view of Tsuchiya in further in view of Zhou US 5,780,358) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of

Claims 6 and 21 under 35 U.S.C. 102(b) by Kobayashi (US 5,985,045

Claims 22-24 under 35 U.S.C. 103(a) over Kobayashi (US '045) as applied to claim 21 above, and further in view of Tsuchiya et al. (US 5,733,177) and Claims 25-28 are rejected under 35 U.S.C. 103(a) over Kobayashi (US '045) in view of Tsuchiya et al. (US '177) and

Claim 8 is under 35 U.S.C. 103(a) over Kobayashi (US '045) in view of Tsuchiya (US '177) as applied to claim 25 above, and further in view of Zhou et al. (US 5,780,358).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1765

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Art Unit 1765

ltue

September 27, 2007

NADINE G. NORTON  
SUPERVISORY PATENT EXAMINER  
*Nadine*